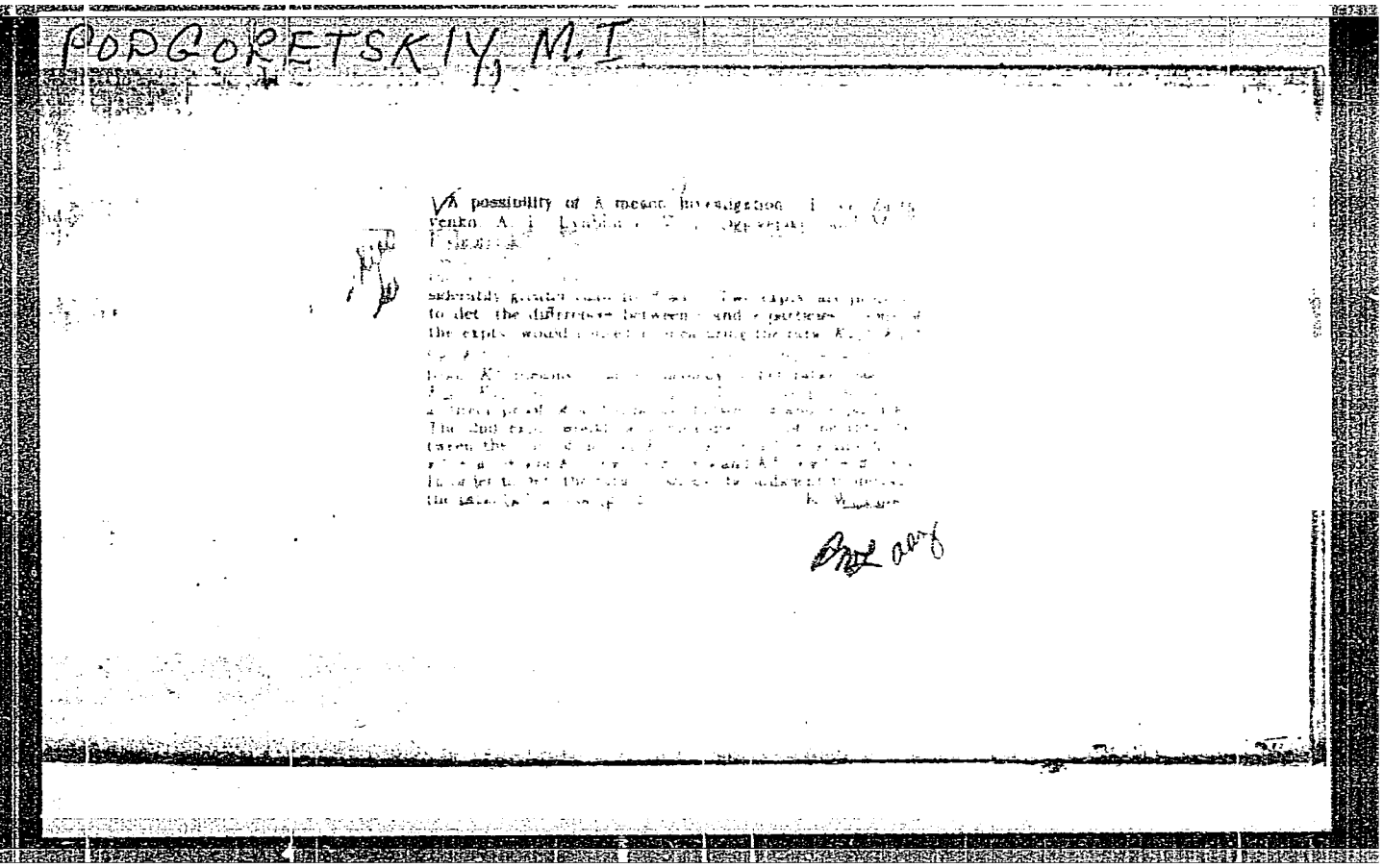
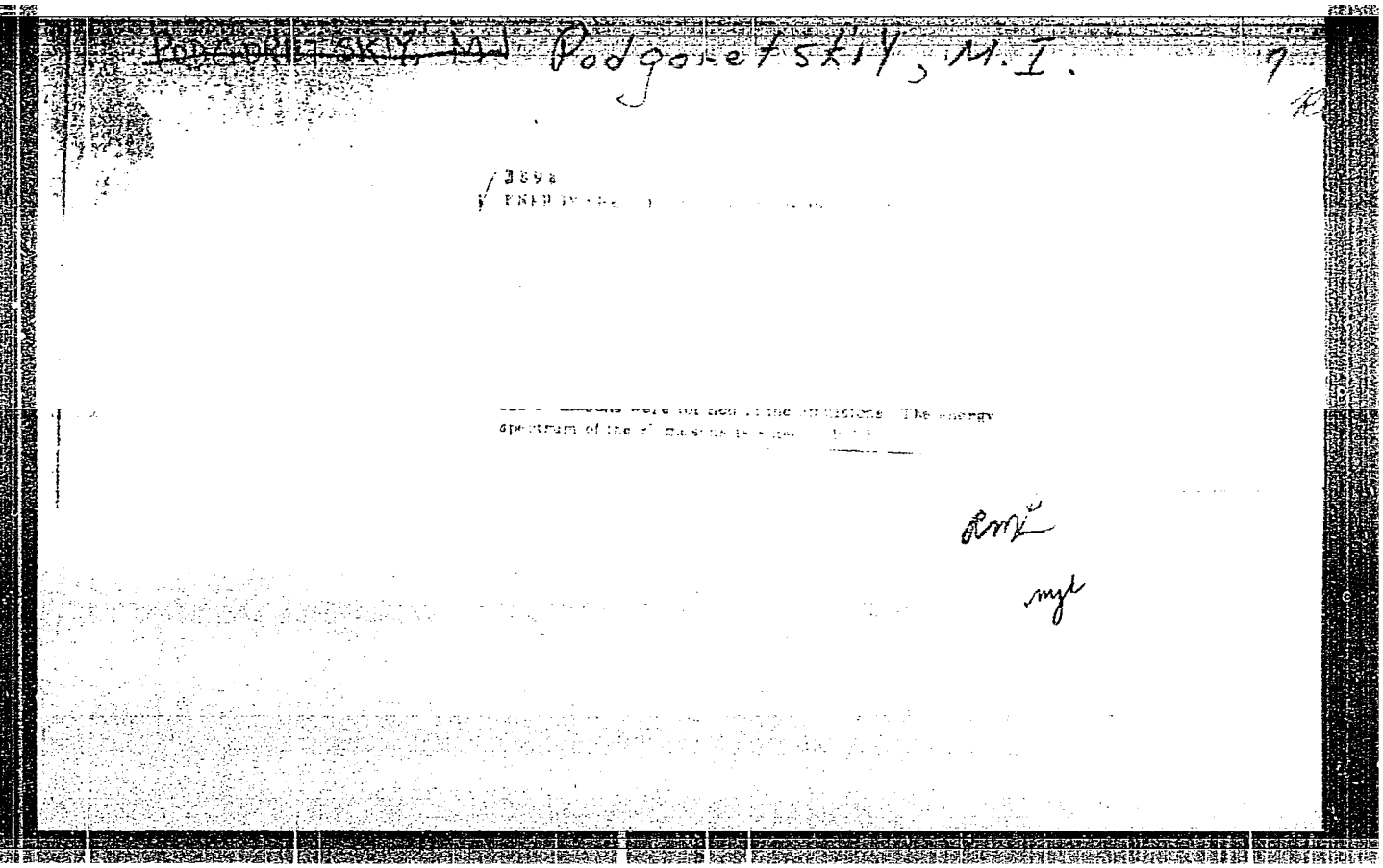
PODGORETSKIY, M.I., red.

[Materials of the Conference on Methods of Thick-layer Photographic Emulsions] Materialy soveshchaniia po metodike tolstosloinykh fotoemulsii. 1957. 2 v. (MIRA 13:6)

1. Dubno. Ob"yedinennyy institut yadernykh issledovaniy.
(Photographic emulsions)





PODGORETSKY, M. Podgoretsky, M. I.

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[illegible] The energy spectrum of the [illegible]

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PODGORETSKIY, M.I.

Distr: 4E3d

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INVESTIGATION OF σ STARS INDUCED BY NEGATIVE π⁻ MESONS. S. A. Azimov, U. G. Gullamov, S. A. Zamchalova, M. Nizametdinova, M. I. Podgoretskii, and A. Yuldashev (Academy of Sciences, USSR and Academy of Sciences, Uzbek, SSR). Soviet Phys. JETP 4, 632-6(1957) June.

The properties of σ-stars produced by π⁻ mesons stopping in an emulsion chamber were investigated. Data obtained from the analysis of 938 σ-stars were used to determine the distribution of the number of prongs as well as the energy distribution of secondary particles. The obtained energy spectrum is compared to the data on σ-stars produced by K⁻-mesons. (auth)

1, RMY

PODGORETSKIY, M.I.

56-3-35/59

AUTHOR: Podgoretskiy, M.I.

TITLE: On the Problem of Superpositions with Respect to the Internal Properties of the Elementary Particles (K voprosu o superpozitsiyakh po vnutrennim svoystvam elementarnykh chastits) (Letter to the Editor)

PERIODICAL: Zhurnal Aksperim. i Teoret. Fiziki, 1957, Vol. 33, Nr 3 (9), pp. 790 - 791 (USSR)

ABSTRACT: Facts which have become known lately tend to confirm the existence of an internal structure of the elementary particles. This internal structure and the internal motions connected therewith may, in analogy to atoms and nuclei, determine the properties of the elementary particles. If also the most general outlines of quantum mechanics are assumed to be true, then superpositions with respect to various general properties of the elementary particles may be assumed, i.e. the realization of states in which the elementary particle is not characterized by a definite value of one or the other of the internal parameters. A much discussed example of the superpositions is connected with the charge-parity (or with the combined parity) and with the strangeness of the K^0-mesons. A further example refers to the spatial parity of

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On the Problem of Superpositions with Respect to the Internal Properties of the Elementary Particles

the strange particles. The existence of particles which have no definite value of spin, is, however, by no means impossible. Far-reaching possibilities would, in the case of the strange particles, offer themselves on the occasion of the investigation of various kinds of angular correlations. An experimentally controlable conclusion would be the change of the ratio between the number of long-lived and short-lived θ^0-mesons. If there exists a law of conservation of any interior property Ω (absolute or only with respect to strong interactions), then the particles describeable by superpositions with respect to Ω on the occasion of the usual collisions of particles can occur in pairs. If, however, only one such a particle exists before the reaction, then at least one particle must be left over after the reaction. The nature of the property Ω might be different from present-day conceptions (strangeness, spatial parity). With such deliberations perhaps not only the law of the conservation of the strangeness, but also some other laws of conservation may be brought into connection. There are 5 references, 3 of which are Slavic.

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56-3-35/59

On the Problem of Superposition with Respect to the Internal Properties of the Elementary Particles

ASSOCIATION: United Institute for Nuclear Research
(Ob"yedinennyy institut yadernykh issledovaniy)

SUBMITTED: June 12, 1957

AVAILABLE: Library of Congress

Card 3/3

SOV/120-58-4-3/30

AUTHORS: Kopylov, G. I. and Podgoretskiy, M. I.

TITLE: Multiple Scattering of Relativistic Particles in an Absorber between Two Collimators (Mnogokratnoye rasseyaniye relyativistskikh chastits v fil'tre mezhdu dvumya kollimatorami)

PERIODICAL: Pribory i tekhnika eksperimenta, 1958, Nr 4, pp 22-23 (USSR)

ABSTRACT: The increase in the path length of fast charged particles due to multiple scattering in the absorber between two collimators is calculated. Pomeranchuk (Ref.1) has estimated the increase in the path length of a particle in an absorber due to multiple scattering. In his calculation, the coordinates and the direction of the particle at the point of entry and the point of exit could be arbitrary. To a researcher it is of interest to have the above quantity in the case where the absrober is placed between two long and narrow collimators. In this case the position and direction of the particles at points of entry and exit in the absorber are completely defined (Fig.1). It is well-known (Ref.2) that the probability $F(\tau, y, \vartheta)$, that a particle at a depth τ will have a displacement y and a direction ϑ is, for small values of ϑ, proportional to $\exp[-w^2\tau^{-3}(\tau^2\vartheta^2 - 3\tau y\vartheta + 3y^2)]$ where w depends on the energy of the

Multiple Scattering of Relativistic Particles in an Absorber between Two Collimators

particle (ionisation energy losses in the absorber are neglected). It follows that the probability that, at a depth τ a particle will have a displacement y and a direction ϑ, under the condition that at the point of exit, i.e. $\tau = t$, the displacement and the direction will be y_1 and ϑ_1 respectively, is proportional to the product $F(\tau, y, \vartheta)F(T, y_1-y-T\vartheta, \vartheta_1\vartheta)$. Integrating over all y, we obtain a quantity which is proportional to the probability that at a depth τ the particle will have a direction ϑ and this is given by:

$$W(\tau, \vartheta) \sim \exp\left\{-\left[w^2/4\tau(\tau^3 + T^2)\right] \times \left[t^4T^{-1}\vartheta^2 + 2(2T - \tau)t^2\vartheta_1\vartheta - \right.\right.$$

$$\left.\left. - 12t\tau y_1\vartheta + 12\tau y_1^2 - 12\tau^2 y_1\vartheta_1 + (\tau^3 + 4T^3)\vartheta_1^2\right]\right\} \qquad (1)$$

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Multiple Scattering of Relativistic Particles in an Absorber between Two Collimators

The quantity $\bar{\vartheta}^2$ can be determined from Eq.(1). In accordance with Eq.(1) the required average increase in the range may be obtained from the integral $\Delta\bar{s} = \int_0^t \bar{\theta}^2 d\tau$ and turns out to be $\Delta\bar{s} = 2/15 t^2 w^{-2}$. (2)

A similar calculation in Ref.1 led to the expression $\Delta\bar{s} = t^2 w^{-2}$. Thus the presence of the collimators reduces the increase in the path length of the particle as found in Ref.1 by a factor of 7.5 which, in practical cases, corresponds to a fraction of a percent. A simple calculation shows that the maximum value of the mean square angle of the track of the particle to a straight line is equal to $1/12 t^2 w^{-2}$. This is less by a factor of 8 than the corresponding quantity in the absence of the collimators. The maximum of the mean square scattering angle for particles which pass both the collimators is found at a distance of $1/6(3 - \sqrt{3})t$ from the face of the absorber and is equal to $1/6tw^{-2}$.

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Multiple Scattering of Relativistic Particles in an Absorber between Two Collimators

This is less by a factor of 24 than the maximum value of the mean square of the angle in the absence of the collimators. In Ref.2 the 2-dimensional case was generalised to include the general 3-dimensional case. In the general case, if the position of the collimators in space is characterised relative to an axis A by the displacement and direction vectors $\boldsymbol{r}$ and $\boldsymbol{\theta}$, we find that:

$$\Delta\bar{s} = (2/15)t^2w^2 + (2t^2\theta^2 - 3t\theta r + 18r^2)/15t \quad . \qquad (3)$$

It is of interest to solve this problem in the case where, at the exit from the filter, either only the position $\bar{r}$ or only the direction $\bar{\theta}$ of the particles are fixed. In this case Eq.(1) should be averaged over ϑ_1 or y_1. In the first case one obtains:

$$\Delta\bar{s} = 1/5(t^2w^{-2}) + 4.8r^2t^{-1} \quad ;$$

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Multiple Scattering of Relativistic Particles in an Absorber between Two Collimators

and in the second:

$$\Delta\bar{s} = 1/3\ (t^2w^{-2}) + 1/6t\theta^2 \quad .$$

There is one diagram illustrating the symbols used in the text and two references, both of which are Soviet. This is a complete translation.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (United Institute for Nuclear Studies)

SUBMITTED: October 14, 1957.

PODGORETSKIY, M.I.

AUTHORS: Bogachev, N. P., Van Shu-Fen', Gramenitskiy, I. M., Kirillova, L. F., Lebedev, R. M., Lyubimov, V. B., Markov, P. K., Merekov, Yu. P., Podgoretskiy, M. I., Sidorov, V. M., Tolstov, K. D., Shafranova, M. G.

TITLE: The Interaction of 9 Bev Protons with Nuclei in Photo-Emulsion (Vzaimodeystviye protonov s energiyey 9 Bev s yadrami fotoemul'sii)

PERIODICAL: Atomnayay Energiya, 1958, Vol. 4, Nr 3, pp. 281 - 284 (USSR)

ABSTRACT: The photoemulsion НИКФИ-Р with a layer of about 450 μ was irradiated with protons within and out of the vacuum chamber of the 9 Bev synchrophasotron. The mean range of 9 Bev protons for an interaction is 34,7 ± 1,5 cm. (The scattering for angles below 5° was not taken into account), 258 cases of a nuclear interaction were observed. The mean number of fast particles n generated in a process of interaction amounts to 3,4 ± 0,7. The angular distribution of these particles shows a clearly preferred forward motion. The mena number of black and grey traces. N_n - the recoil nuclei not being considered - is 8,3 ± 0,5.

From 249 found stars 18 can be considered to constitute an

interaction of the initial protons with "free" or "quasifree" prtons. 13 stars can be considered to represent an interaction between protons and "quasifree" neutrons. All of them have an odd number of traces. and int the point of formation of the star β-traces can be observed. The mean number of fast particles in these 13 star traces is $3,1 \pm 0,3$. There are 5 figures, 1 table, and 7 references, 1 ow which is Slavic.

Podgoretskiy M. I.

AUTHORS: Bannik, B. P., Gulyamov, U. G., Kopylova, D. K., 56-2-3/51
Nomofilov, A. A., Podgoretskiy, M. I., Rakhimbayev,
B. G., Usmanova, M.

TITLE: Hyperfragments in Nuclear Emulsions (Giperfragmenty v yadernykh emul'siyakh)

PERIODICAL: Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, 1958, Vol 34, Nr 2, pp 286-297 (USSR)

ABSTRACT: The present work investigates the properties and the relative frequency of the production of hyperfragments in two emulsion chambers, which are exposed to cosmic irradiation in the stratosphere. One of the chambers consisted of 600 μ thick emulsion layers of the Ilford type (Il'ford) G-5 and had been irradiated during the international expedition in the Po plains, the second chamber consisted of НИКФИ layers of the P type (thickness 400 μ) and was irradiated in the Soviet Union. In this investigation shortly discussed here 6π-mesons, 1π'-meson, 1Λ^0-particle, 4 K^--mesons, 1Σ^--hyperon and 5 hyperfragments (of which 5 decayed with the emission of one pion) were found. Not one decay of a Σ^+-hyperon or of a K^+-meson was found, because the method used for

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investigating the emulsion layers excluded the determination of such particles. In all cases the traces of secondary pions were coplanar within 2-3°. The decay of a particle with the mass $(860 \pm 50)m_e$ is shown by means of a diagram; this is obviously the decay $\tau' \rightarrow \pi^+ + \pi^0 + \pi^0$ with the subsequent decay $\pi^0 \rightarrow \gamma + e^+ + e^-$. The mass of the K^--meson was determined from the multiple scattering as well as from the remaining range and amounted to $(1100 \pm 250)m_e$. One of the particles developing in the five-membered star causes a small secondary destruction. With all possible variants of nuclear capture the total energy output is considerably greater than $m_\pi c^2$. The same applies to two of the three other σ_K-stars, too. Obviously all σ_K-stars found here developed in capturing K^--mesons in the light nuclei of the emulsion. In the present work 10 hyperfragments were found which correspond to the criteria suggested by A. Filipkovskiy et al. (ref. 7). (Of these 10 hyperfragments five ended by mesonless decay, the remaining 5 by mesonic decay). For these processes decay the following decay schemes are proposed: ${}_\Lambda He_2^5 \rightarrow He_2^4 + p + \pi^-$, ${}_\Lambda He_2^5 \rightarrow He_2^3 + p + \pi^-$,

Card 2/3 ${}_\Lambda He_2^5 \rightarrow He_2^5 + p + \pi^-$, ${}_\Lambda H_1^4 \rightarrow He_2^4 + \pi^-$, ${}_\Lambda Li_3^7 \rightarrow He_2^4 + 2p +$

Hyperfragments in Nuclear Emulsions

56-2-3/51

+ n + π^-. There are 4 figures, 3 tables, and 17 references, 5 of which are Slavic.

ASSOCIATION: United Institute for Nuclear Research (Ob"yedinennyy institut yadernykh issledovaniy) Tashkent Physico-technical Institute (Tashkentskiy fiziko-tekhnicheskiy institut)

SUBMITTED: July 12, 1957

AVAILABLE: Library of Congress

1. Nuclear emulsions-Hyperfragments determination

Card 3/3

56-2-51/51

AUTHORS: Podgoretskiy, M. I., Rozental', I. L., Chernavskiy, D. S.

TITLE: A Correction of the Article "On Fluctuations in the Collision of Particles of High Energy" (Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, 1955, Vol 29, p 296) (Popravka k stat'ye " O fluktuatsiyakh pri stolknovenii chastits vysokoy energii (ZhETF), 29, 296, 1955))

PERIODICAL: Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, 1958, Vol. 34, Nr 2, p 536 (USSR)

ABSTRACT: In the article mentioned in the title an error occurred in the calculation of the quantity $\overline{(n - \bar{n})(E - \bar{E})}$.

The wrong numerical values resulting from this are corrected and replaced by the right values. The authors thank A. I. Nikishov for his valuable information.

AVAILABLE: Library of Congress

Card 1/1 1. Theoretical corrections

21(7)

SOV/56-35-2-56/60

AUTHORS: Gramenitskiy, I. M., Danysh, M. Ya., Lyubimov, V. B., Podgoretskiy, M. I., Tuvdendorzh, D.

TITLE: Concerning the Problem of the Angular Correlation Between the Secondary Particles Which Are Generated in Nuclear Collisions of High Energy (K voprosu ob uglovoy korrelyatsii mezhdu vtorichnymi chastitsami, obrazuyushchimisya v yadernykh stolknoveniyakh vysokoy energii)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol 35, Nr 2(8), pp 552-553 (USSR)

ABSTRACT: The above-mentioned relativistic particles were generated by the interaction of protons (~ 9 BeV) with the nuclei of the photoemulsion. The authors measured the coefficient of the correlation between the number of the particles which fly away at different spatial angles. For the correlation coefficient $R = n_1 n_2 - \bar{n}_1 \bar{n}_2$ the expression $R = p_1 p_2 (D_n - \bar{n})$ may be obtained. n_1 and n_2 denote the numbers of the secondary relativistic particles in any separate star the emission directions of which are within the spatial angles Ω_1 and Ω_2.

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Concerning the Problem of the Angular Correlation Between the Secondary Particles Which Are Generated in Nuclear Collisions of High Energy

$\bar{n}$ denotes the average number of the particle in the star and D_n - the dispersion of the particle number. In order to measure the value of R, the authors used 450 nuclear spallations which were found by examination of an emulsion chamber consisting of emulsions NIKFI -«R» with a density of 400 μ. This chamber was irradiated by the internal beam of the synchrophasotron of the Ob"yedinennyy institut yadernykh issledovaniy (United Institute of Nuclear Research). The investigation was carried out along the tracks made by the primary protons. For $\bar{D}_n$ and $\bar{n}$ the values $3{,}64 \pm 0{,}15$ and $3{,}23 \pm 0{,}09$ respectively, were found. Further investigations are based on the measurement of the quantity $Q = \bar{R} - p_1 p_2 (D_n - \bar{n})$ for different values of the angles Ω_1 and Ω_2. The results of these measurements are given in a table. According to these results, there is no total statistical independence between the emission directions of the secondary particles. 6 "narrow pairs" (uzkaya para) were found by the analysis of 375 spallations. The investigation of the correlations in the direc-

Concerning the Problem of the Angular Correlation Between the Secondary Particles Which Are Generated in Nuclear Collisions of High Energy

tions of emission of the secondary particles may be useful for the verification of the statistical theory of the multiple production of pairs. For this purpose, it is essential to investigate the elementary collisions of nucleons and pions with nucleons. Moreover, it is necessary to take into account the possible existence of angular correlations which are connected with the conservation laws. The authors thank E. V. Yesin, T. V. Pokidov, L. I. Fedorov and M. I. Filippov for their participation in carrying out measurements and D. S. Chernavskiy for his discussion of the results of this paper. There are 1 figure and 4 references, 2 of which are Soviet.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (United Institute for Nuclear Research)

SUBMITTED: May 31, 1958

PODGORETSKIY, M.I.

21(7) PHASE I BOOK EXPLOITATION SOV/3050

Gol'danskiy, Vitaliy Iosifovich, Andrey Varfolomeyevich Kutsenko and Mikhail Isaakovich Podgoretskiy.

Statistika otschetov pri registratsii yadernykh chastits (Statistics of Readings in Recording of Nuclear Particles) Moscow, Fizmatgiz, 1959. 411 p. 6,000 copies printed.

Ed.: B. L. Livshits; Tech. Ed.: K. F. Brudno.

PURPOSE: This book is intended for research physicists in nuclear physics and elementary particles.

COVERAGE: The authors examine statistical problems in the recording of separate particles. The problems are based predominantly on discrete (Poisson and binomial) distributions. They also engage in a detailed analysis of problems relating to the observation of radioactive disintegration, statistics of readings in scaling and coincidence circuits, as well as in counters with dead time. No personalities are mentioned. References accompany each chapter.

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PODGORETSKY, M.

CONCERNING ABNORMAL CASES OF HYPERFRAGMENT DECAY

S. A. Azimov, U. Gulyamov, M. Podgoretsky, B. Rakhimbayev

Result of the investigation of hyperfragments using thick photoemulsions are presented. From a total of 60,000 observed stars containing more than 7-6 black and grey spurs, 9 cases of hyperfragment decay were detected. In two of these cases, abnormal decays with an ojection of a k-meson were observed.

If the K-meson is regarded as a decay product of a heavier hyperon than Ξ (distinct from the cascade hyperon since it does not produce K-meson during decay), then it follows from the obtained decay schemes that the mass of these particles should be $\sim 3{,}000\ m_e$.

Report presented at the International Cosmic Ray Conference, Moscow, 6-11 July 1959.

APPROVED FOR RELEASE: 07/13/2001 CIA-RDP86-00513R001341420014-1"

Podgoretskiy, M. I.

3

21(7) SOV/56-36-3-6/71

AUTHORS: Bayatyan, G. L., Grammenitskiy, I. M., Nomofilov, A. A., Podgoretskiy, M. I., Skzhipchak, E. S.

TITLE: The Production of π^0-Mesons in the Interaction Between Protons With Energies of ~ 9 Bev and Photoemulsion Nuclei (Generatsiya π^0-mesonov pri vzaimodeystviyakh protonov s energiyey ~ 9 BeV s yadrami fotoemul'sii)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 36, Nr 3, pp 690-693 (USSR)

ABSTRACT: For the purpose of solving the problem of the interaction of high-energy particles, it is of interest to know the energy portion k carried off by secondary π-mesons. Grigorov and Murzin (Ref 1) determined k as amounting to ~ 30% for interaction between cosmic particles ($E \sim 10^{10}$ ev) and light nuclei. The present paper deals with investigations of the average energy of π^0-mesons produced by ~ 9 Bev protons on photoemulsion nuclei. NIKFI emulsions of the type R (450μ) were used. Proton irradiation was carried out on the synchrophasotron of the OIYaI. Investigation was indirect; the electron-positron pairs were investigated which had been produced by the γ-quanta originating from π^0-decay. For $R = n_{\pi^0}/n_s$ an

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The Production of π^0-Mesons in the Interaction Between Protons With Energies of ~ 9 Bev and Photoemulsion Nuclei

estimate is $R \sim 0.5$. Figure 1 shows the measured distribution of the angles of emission of electron-positron pairs, of the fast charged particles of stars, found by prolonging the traces of primary protons and of stars, found by following the fast secondary particles. For n_s' and N_h 4.5±0.2 and 7.8±0.7 is obtained, which agrees well with the values of reference 4. The mean energy of π^0-mesons is determined from $f = \overline{E}_{\pi^0}/\overline{E}_\gamma$, for $f = 1.8$ $\overline{E}_{\pi^0} = 750 \pm 180$ Mev is obtained. The mean energy generated by a π-meson, according to $\overline{E}_\pi = 3/2 \cdot (n_s - a)\overline{E}_{\pi^0}$, becomes $\overline{E}_\pi = 3.0 \pm 0.7$; a more exact estimate gives 2.5±0.6. The energy portion k carried off by π-mesons therefore amounts to 0.33±0.08 ≤k≤0.27±0.07. In conclusion, the authors thank M. Ya. Danysh for discussing results, and V. P. Solomakhina for assisting in the work of evaluation. There are 2 figures and 8 references, 5 of which are Soviet.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (Joint Institute for Nuclear Research)

SUBMITTED: July 28, 1958

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24(5), 21(1)

AUTHORS: Grishin, V. G., Podgoretskiy, M. I. SOV/56-36-5-60/76

TITLE: Comments on the Optical Nuclear Model (Zamechaniya k opticheskoy modeli yadra)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 36, Nr 5, pp 1593-1594 (USSR)

ABSTRACT: In the present "Letter to the Editor" the authors compare several scattering formulas with the corresponding formulas of the optical model. The formula for the scattering amplitude $f(\vartheta)$ of particles on a center of force (potential $U(\vec{r})$) is given as well as the formula for the case in which the scatterer consists of equal and independent elementary centers. Into the latter the density of the elementary scattering centers is introduced, and by means of it a function is formulated, which plays the part of a generalized form factor. The scattering amplitude is then proportional to the product of the scattering amplitude $f_o(\vartheta)$ on a free elementary center and the form factor. The formula for the scattering amplitude obtained according to the optical model deviates from the latter (which is more

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Comments on the Optical Nuclear Model

SOV/56-36-5-60/76

accurate). By comparison, the relation $f(\vartheta) = f_{opt}(\vartheta) f_0(\vartheta)/f_0(0)$ is obtained, and for the scattering cross section $\sigma(\vartheta) = \sigma_{opt}(\vartheta)\sigma_0(\vartheta)/\sigma_0(0)$; as $f(0) = f_{opt}(0)$, it holds for the scattering cross section of inelastic interaction that $\sigma_{in} = \sigma_{in\ opt} + \int \sigma_{opt}(\vartheta) \left\{ 1 - \sigma_0(\vartheta)/\sigma_0(0) \right\} d\Omega$

These formulas are the same in the center of mass system as in the laboratory system. They are finally briefly discussed on the basis of the results obtained by several investigations. (Refs 3 - 7). The authors thank S. M. Bilen'kiy, G. V. Yefimov, V. I. Ogiyevetskiy and R. M. Ryndin for taking part in the discussion. There are 7 references, 2 of which are Soviet.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (Joint Institute of Nuclear Research)

SUBMITTED: January 29, 1959

Card 2/2

21 (7), 24 (5)

AUTHORS: Kopylova, D. K., Korolevich, Yu. B., Petukhova, N. I., Podgoretskiy, M. I.

SOV/56-36-6-64/66

TITLE: On the Determination of the Frequency of the Capture of Slow Mesons by Light and Heavy Nuclei in Photoemulsions (Ob opredelenii chastoty zakhvata medlennykh mezonov legkimi i tyazhelymi yadrami v fotoemul'siyakh)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 36, Nr 6, pp 1955 - 1956 (USSR)

ABSTRACT: When working with photoemulsions it is of importance to know the percentage of light (C,N,O) and heavy (Ag, Br) nuclei. The authors of the present "Letter to the Editor" suggest a simple and exact method. They use the nuclear capture of a stopped π^--meson. If an Auger electron is produced by the stopping of a π^--meson, the capture occurred on a heavy nucleus of the emulsion. If the star particle produced by a pion has a range of $\leq 50\mu$ (so-called sub-barrier particles), the capture may be ascribed to light particles. The stars observed are divided into 3 groups: two identifiable groups, and a third that cannot be coordinated to either of the two former; several simple relations are derived. The method was tested on 349 σ_π-stars,

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On the Determination of the Frequency of the Capture of Slow Mesons by Light and Heavy Nuclei in Photoemulsions

SOV/56-36-6-64/66

and for the capture frequency of pions on heavy nuclei the value (63±2.8)% was obtained, which agrees well with the results obtained by means of other methods. The authors thank S. A. Azimov and U. G. Gulyamov for placing material at their disposal. There are 10 references, 1 of which is Soviet.

ASSOCIATION: Ob"yedinennyy institut yadernyk issledovaniy (Joint Institute of Nuclear Research)

SUBMITTED: February 28, 1959

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21 (8)

AUTHORS: Kopylova, D. K., Korolevich, Yu. B., Petukhova, N. I., Podgoretskiy, M. I.

SOV/56-37-1-42/64

TITLE: On the Problem of the Mechanism of Capture of Stopped K^--Mesons (K voprosu o mekhanizme zakhvata ostanovivshikhsya K^--mezonov)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 37, Nr 1(7), pp 289 - 291 (USSR)

ABSTRACT: The authors of the present paper estimate the portion of two-nucleon capture on the basis of the analysis of the number of pions observed in σ_K-stars. x denotes the unknown portion of two-nucleon interactions, α the expected percentage of escaping pions referred to the known mean path of the pions in nuclear matter under the assumption of a certain model of capture of negative K-mesons, β the experimentally observable portion of the interaction of stopped negative K-mesons in which pions are emitted. The relation $(1 - x)\alpha = \beta$ holds in this case. According to former experimental data (Ref 2), the number of two-nucleon captures can not exceed the percentage of $(49 \pm 3)\%$ of the total number of interactions. The portion of pions not participating in any interaction can be determined if the mean

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free path of the pion in nuclear matter is known. It is, however, more difficult to calculate which portion of pions (which have experienced inelastic scattering in the first collision) escapes the nucleus without having been absorbed. The authors estimated the upper and lower limits of α under the assumption that all inelastically scattered pions escape the nucleus (upper limit) or are absorbed in it (lower limit). The upper limit found in this way differs only slightly from the true value of α. For the calculation of α, a certain ratio between the numbers of reactions of the type $K^- + N \longrightarrow \Lambda^0 + \pi$ and of the type $K^- + N \longrightarrow \Sigma + \pi$ is required. The authors assume $\Lambda^0/\Sigma^{\pm,0} = 0.21$ for the surface model, and $\Lambda^0/\Sigma^{\pm,0} = 0.50$ for the volume model. In order to explain the response of the results to small changes in the model of surface absorption, the case was investigated in which the K-mesons are absorbed in the depth of a nucleon radius (distant from the surface of the nucleus). The calculations led to the following results:

Surface absorption:	$0.64 < \alpha < 0.75$	$0.20 < x < 0.32$
Absorption of K-mesons in the depth of a nucleon radius:	$0.62 < \alpha < 0.72$	$0.18 < x < 0.29$
Volume absorption:	$0.32 < \alpha < 0.52$	

Accordingly, the two first-mentioned models differ only slightly from each other, and the volume model offers no explanation of two-nucleon capture. The reactions of the type $K^- + N \rightarrow$ $\rightarrow \Lambda^0 + \pi$ amount to 15-35% of all one-nucleon capture reactions. Starting from the surface model of one-nucleon capture, two-nucleon capture probably amounts to 30% of all cases, and the Σ-hyperons with $E_\Sigma < 60$ Mev are strongly absorbed within the nucleus. The number of fast Σ-hyperons with $E_\Sigma > 60$ Mev (charged and neutral) amount, according to data by M. F. Kaplon, to ~3.5% of the total number of captures of negative K-mesons.

The authors thank M. Ya. Danysh for his participation in the discussion and for his information on the critical remarks by

On the Problem of the Mechanism of Capture of Stopped K^--Mesons SOV/56-37-1-42/64

Ye. Markit. There are 8 references.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (Joint Institute of Nuclear Research)

SUBMITTED: February 27, 1959

Card 4/4

21 (8)
AUTHORS: Gol'danskiy, V. I., Podgoretskiy, M. I. SOV/56-37-1-56/64

TITLE: A Possible Way of Identifying New Transuran Elements (Vozmozhnyy sposob identifikatsii novykh transuranovykh elementov)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 37, Nr 1, pp 315 - 317 (USSR)

ABSTRACT: In the present "Letter to the Editor" a simple way of determining the genetic connection between the mother-isotope A and the long-lived daughter-isotope B is described. This method is based upon measuring the periods of time between two adjoining decays of B and B (τ_{BB}), and between adjoining decays of A and B (τ_{AB}); $\overline{\tau}_{AB} < \overline{\tau}_{BB}$. If n is assumed to be the average frequency of the decays of B, τ - the radioactive decay constant B, and g the degree of efficiency of the recording of the decays of B; and if, further, (M + 1) decays of B (i.e. M intervals BB) at N decays of A (N intervals AB) are observed, it holds for the case of an uninterrupted observation of decays of A and B that: $\varkappa = (\overline{\tau}_{BB} - \overline{\tau}_{AB})/\overline{\tau}_{AB} = g\lambda\left[gn + (1 - g)\lambda\right]$; $\varkappa$ characterizes the connection between the decays of A and B and is called correla-

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tion coefficient. If the decay of B is quite independent of the decay of B, then $\varkappa = 0$ $(\lambda/n \to 0)$, with $g = 1$, it holds that $\varkappa = \lambda/n$. The absolute error committed in determining $\varkappa$ is obtained according to the formula

$$\Delta\varkappa \approx \frac{gn+\lambda}{gn+(1-g)\lambda}\left[\frac{1}{M}+\frac{1}{N}\left\{1-\frac{g\lambda(g\lambda+2gn}{(gn+\lambda)^2}\right\}\right]^{1/2}$$

With $g = 1$ the above is simplified to the approximation formula $\Delta\varkappa \approx \left[(1+\varkappa)^2/M+1/N\right]^{1/2}$. In conclusion, a simple numerical example is given.

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva Akademii nauk SSSR (Physics Institute imeni P. N. Lebedev of the Academy of Sciences, USSR). Ob"yedinennyy institut yadernykh issledovaniy (Joint Institute of Nuclear Research)

SUBMITTED: April 10, 1959

PODGORETSKIY, M. I.

24.6200,24.6510,
24.6520,24.6900

76971
SOV/56-37-6-11/55

AUTHORS: Bannik, B. P., Grishin, V. G., Danysh, M. Ya., Lyubimov, V. B., Podgoretskiy, M. I.

TITLE: Elastic Scattering of 8.7 bev Protons on Photographic Emulsion Nuclei

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 37, Nr 6, pp 1575-1582 (USSR)

ABSTRACT: A study was made of the elastic scattering of the 8.7 bev protons on photographic nuclear emulsions (type NIKFI-R, 450 μ thick). The intensity of the irradiation was approximately 10^4 particles/cm^2. The proton beam passed along the chamber at a 0.7° angle to the plane of the emulsion layer. The distribution and measurement of tracks was done optically under 60 x 10 x 1.5 magnification. The selection of pairs was done according to the following conditions: (1) relativistic ionization; (2) projection of the angle formed by the track with the beam axis at angle <2°; (3) distance between tracks not less than

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2.

50-60 μ in the emulsion plane and 25-30 μ in the depth; and (4) visual absence of an inclination of the track toward emulsion layer. This method yielded 601 pairs of tracks at a 95-mm distance from the edge of the emulsion. The angular distribution of tracks is plotted in Fig. 1. The mean square root error involved in measuring the angular distribution was $\Delta\theta$ = 0.03°. In a similar way was measured the angular distribution of 572 pairs at R = 5 mm. The differential and the total cross section of elastic scattering, $(d\sigma/d\Omega)_d$ and σ_d respectively, were calculated on the basis

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SOV/56-37-6-11/55

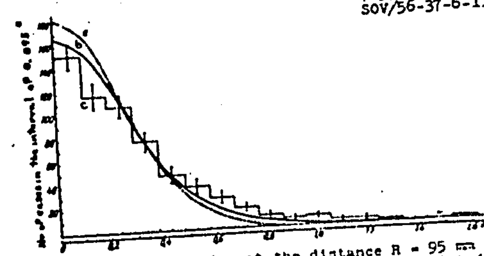

Fig. 1. The angular distribution at the distance R = 95 mm from the edge of emulsion chamber. (a) Calculated angular distribution compensated for the initial angular distribution at R = 5 mm and for multiple coulomb scattering; (b) calculated angular distribution compensated for the initial angular distribution, for the multiple coulomb scattering at k_1 = 0; (c) measured angular distribution.

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Elastic Scattering of 8.7 bev Protons on Photographic Emulsion Nuclei

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of the optical model of J. W. Cronin, R. Coll, and A. Abashian (cf. Phys. Rev., 107, 1121, 1957):

$$\left(\frac{d\sigma}{d\Omega}\right)_e \sim \left|k_0 \int_0^\infty (1 - \exp(-\bar{\sigma}\rho_0 S(b)))\, J_0(k_0 b \sin\theta)\, b\, db\right|^2$$

$$\sigma_e = 2\pi \int_0^\infty (1 - \exp(-\bar{\sigma}\rho_0 S(b)))^2\, b\, db.$$

The analysis showed a good accord between the experimental data and the optical model, if compensation is made for refraction in the nucleus. The work was carried out under the guidance of I. M. Gramenitskiy; P. K. Markov and E. N. Tsygankov participated in the discussion of this work; calculations and measurements were done by V. M. Gorbunkov, A. I. Radionov, L. I. Aver'yanova, Z. P. Golovina, T. A. Zhuravleva, N. V. Kirsanova, M. P. Koteneva, A. I. Maklachkova, O. A. Nurusheva, and G. P. Tyupikova. The text contains 2 tables; 4 graphs; and 12 references, 6 Soviet, 1 U.K., 5 U.S. The 5 most recent U.S. and U.K. references are: 1958 Ann. Intern. Conf. on High Energy

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Elastic Scattering of 8.7 bev Protons on Photographic Emulsion Nuclei

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SOV/56-37-6-11/55

Physics at CERN, Geneve, p 309; J. W. Cronin, R. Cool, A. Abashian, Phys. Rev. Nr 7, 1121, 1957; I. H. Atkinson, W. H. Hess, V. Perez-Mendez, R. W. Wallace. Phys. Rev. Lett., 2, 168, 1959; N. E. Booth, Mr. B. Ledley, D. Walker, D. H. White, Proc. Phys. Soc. A70 209, 1957; F. F. Chen, C. P. Leavitt, A. M. Shapiro, Phys. Rev. 99,857, 1955.

ASSOCIATION: Joint Inst. Nuclear Research, USSR (Ob'edinenyy institut yadernykh issledovaniy, SSSR)

SUBMITTED: June 9, 1959

Card 5/5

APPROVED FOR RELEASE: 07/13/2001 CIA-RDP86-00513R001341420014-1"

Podgoretskiy, M.I.

81982

pa

S/120/60/000/03/009/055
E032/E514

21.5200

AUTHORS: Bannik, B.P. and Podgoretskiy, M.I.

TITLE: A Method of Rapid Scanning of Photo-emulsions Along Tracks

PERIODICAL: Pribory i tekhnika eksperimenta, 1960, No 3, pp 36-37

ABSTRACT: NIKFI-R nuclear emulsions 450 μ thick were irradiated with 9 BeV protons in a beam having an intensity of 10^4 particles per cm^2. The angular divergence of the beam was 0.1° in the plane of the emulsion, and 0.2° in the plane perpendicular to the emulsion. The angle between the beam and the plane of the emulsion was 0.4°. 2 mm sections of minimum ionisation tracks found in the lower half of the emulsion were successively inspected under a microscope. A rate of 3.5 m/day was achieved. A single observer working at the rate of 5 hours per day for 6 days inspected 1005 tracks having a total length of 2094 cm. In this way 62 stars and 32 single scatters were found. The inelastic interaction length was found to be 33.8 ± 4.3 cm. Acknowledgment is made to

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S/120/60/000/03/009/055
E032/E514

A Method of Rapid Scanning of Photo-emulsions Along Tracks

M. Ya. Danysh, I. M. Gramenitskiy and G.A.Nurusheva for help in the present work.
There is 1 Soviet reference.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (Joint Institute for Nuclear Studies)

SUBMITTED: April 17, 1959

Card 2/2

BARIT, I.Ya.; PODGORETSKIY, M.I.; SHAPIRO, F.L.

Some possible applications of gamma-ray resonance scattering.
Zhur. eksp. i teor. fiz. 38 no.1:301-302 Jan '60. (MIRA 14:9)

1. Fizicheskiy institut im. P.N.Lebedeva AN SSSR.
(Gamma rays--Scattering)
(Nuclear magnetic resonance and relaxation)

PODGORETSKIY, M.I.

81391

S/056/60/039/004/009/048
B004/B070

24.6900

AUTHORS: Van Shu-fen', Vishki, T., Gramenitskiy, I. M., Grishin, V. G., Dalkhazhav, N., Lebedev, R. M., Nomofilov, A. A., Podgoretskiy, M. I., Strel'tsov, V. N.

TITLE: Inelastic Interactions of 9 Bev Protons With Nucleons

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960, Vol. 39, No. 4(10), pp. 957-960

TEXT: In an earlier work (Ref. 1), the authors carried out the identification of particles and the measurement of their energies only for slow particles. In the present work, the study of pp and pn interactions is continued under conditions permitting the measurement of multiple scattering of fast particles. An НИКФИ-Р (NIKFI-R) emulsion pile was irradiated by 9-Bev protons from the proton-synchrotron of the authors' institute. The inelastic pp (161 events) and pn (94 events) interactions were selected according to the criterion described in Ref. 1. The average number of charged particles in pp interactions was 3.25±0.10

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and in pn interactions 2.58±0.14. The identification was made according to Ref. 3 by means of the function $g/g_0 = f(p\beta)$ for pions and protons. The identification was not certain in the range ($1.5 \leqslant p\beta \leqslant 2.5$ Bev/c) where the curves for protons and pions intersected one another (Table 1). The angular distribution of the secondary protons (in c.m.s.) from pp interactions was strongly anisotropic; the same was true for the pions (Fig. 2). The momentum distribution is shown only for the protons emitted backwards (Fig. 3), because due to spurious scattering only the lower limit of $p\beta$ could be determined for forward emission. Fig. 4 gives the angular distribution of protons in pn interactions. Since there is no difference in the values of angular distribution and energy for pp and pn interactions, the authors treat the two together for higher statistical accuracy. The values of $\bar{p}$, $\bar{p}_\perp$, and $\bar{W}$ for protons and pions are given in Table 2 for lower (n = 2,3,4) and higher (n = 5,6,7) multiplicities. The values of $a = \sqrt{\overline{p_\perp^2}/2}$ for the lower and higher multiplicities are given in Table 3. The data show that the character of the interaction is only slightly affected by the number of the secondary charged particles.

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The authors thank D. I. Blokhintsev and V. I. Veksler for discussions. There are 4 figures, 3 tables, and 7 references: 6 Soviet and 1 US.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (Joint Institute of Nuclear Research)

SUBMITTED: May 12, 1960

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84405
S/056/60/039/004/023/048
B006/B063

24.6210
AUTHORS: Zastavenko, L. G., Podgoretskiy, M. I.

TITLE: Effect of External Fields Upon the Angular Correlations and Resonance Processes Occurring During Quantum Transitions

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960, Vol. 39, No. 4(10), pp. 1023-1026

TEXT: A general method of determining splittings and shifts of quantum levels during the emission of light and gamma radiation was suggested by Podgoretskiy in Ref. 5. To illustrate the application of this method, the authors describe a theoretical investigation of the scattering of light and gamma rays by isolated and overlapping magnetic sub-levels. The Stark effect is studied, and the Stark constant of an excited atom is determined by studying the resonance scattering of light in parallel electric and magnetic fields. The first section deals with the Stark splitting of excited atomic levels. The authors suggest determining the Stark constants by determining the dependence of resonance scattering on the magnetic field in the presence of a constant electric field, that is to say,

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Effect of External Fields Upon the Angular Correlations and Resonance Processes Occurring During Quantum Transitions

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determining the Stark constants from the narrow peaks of the curve, which are due to overlapping levels of different m. Nuclear quadrupole splitting may be measured analogously, by studying the non-monotony of the curve representing the γ-γ correlation as a function of the magnetic field strength if $\vec{H}$ is parallel to the electric field of the crystal. The second section deals with the effect of the magnetic field upon the resonance scattering of gamma rays under conditions permitting the use of Mössbauer's technique. Cross-section formulas and formulas for the angular distribution in resonance scattering in the absence of a field and in the presence of a strong field are derived. The authors thank Professor M. A. Markov and Professor I. Ya. Pomeranchuk for discussions. There are 8 references: 1 Soviet, 3 US, 2 German, 1 British, and 1 Swiss.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (Joint Institute of Nuclear Research)

SUBMITTED: April 19, 1960

Card 2/2

6.4 PODGORETSKIY, M. I.

86895

S/056/60/039/005/011/051
B029/B077

24.6900

AUTHORS: Dzhaneliodze, L. P., Kopylova, D. K., Korolevich, Yu. B., Kostanashvili, N. I., Mandritskaya, K. T., Petukhova, N. I. (Deceased), Podgoretskiy, M. I., Tsvtendorzh, D., Shakhulashvili, O. A., Chzhen Pu-in

TITLE: Formation of Charged Hyperons During Interactions of 9-Bev Protons With Nuclei of a Photoemulsion

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960, Vol. 39, No. 5(11), pp. 1237-1241

TEXT: The authors investigated the angular distribution of positive and negative pions formed in decays of $\Sigma^{\pm}$ hyperons formed in their turn by the interaction of 9-Bev protons with photoemulsion nuclei. The authors irradiated two emulsion chambers: $(10 \cdot 10 \cdot 6)cm^3$ (chamber 1), and $(10 \cdot 15 \cdot 4)cm^3$ (chamber 2). These chambers consist of БР-400 НИКФИ (BR-400 NIKFI)-type emulsion layers. 9-Bev protons of the proton-synchrotron of the Laboratoriya vysokikh energiy OIYaI (High-energy Laboratory of the Joint Institute of Nuclear Research) were used to bombard the

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emulsions. Angular distribution of the decay products of $\Sigma^{\pm}$ hyperons: V. G. Solov'yev (Ref. 2) has already emphasized the importance of investigating the longitudinal asymmetry found in the angular distribution for pions formed during a hyperon decay. Fig. 1 shows the angular distribution of pions relative to its direction of motion in the rest system of the hyperon; the authors paid special attention to the calculation of these values. If the angular distribution is approximated by $1 + a \cos \theta^{*}$, then the coefficient of asymmetry has the form $a = \alpha \bar{P}_{\Sigma}$

$$= \frac{3}{N} \sum_{i=1}^{N} \cos \theta_i^{*} \pm \left(\frac{3 - a^2}{N}\right)^{1/2} = 0.03 \pm 0.2;$$

α denotes the coefficient of asymmetry for total hyperon polarization, $\bar{P}_{\Sigma}$ the vector component of the mean Σ hyperon polarization in the direction of motion, θ_i^{*} the angle between the directions of emission of hyperon and pion in the rest system of the hyperon, and N the number of hyperons observed. The following holds for the angular distribution of pions relative to the production level of Σ hyperons: $b = 2(N_{forward} - N_{backward})/(N_{forward} + N_{backward}) = 0.36 \pm 0.22$.

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Fig. 2 shows the angular distribution of $\Sigma^{\pm}$ hyperons with necessary corrections. The ratio of the number of positive and negative hyperons is $N_{\Sigma^+}/N_{\Sigma^-} = 3.2 \pm 0.1$. All black and gray tracks were investigated in 76 stars which displayed decaying stars according to the mode $\Sigma^{\pm} \rightarrow \pi^{\pm} + n$. Four pair productions of a Σ^- hyperon and a K^+ meson, two pair productions of K^+ and K^- mesons, and a production of two hyperons in a single star were found. A star of the type (17 + 7p) had two gray particles which decay into a relativistic particle during motion. This particle might have been a hyperon. The annihilation of one antiproton was observed in the extension of the selected rays. The authors thank E. L. Andronikashvili and V. I. Veksler for their interest, and the operators of the synchrotron and all laboratory assistants for taking part in the evaluation of the photoemulsions. There are 4 figures and 6 Soviet references.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (Joint Institute of Nuclear Research). Institut fiziki Akademii nauk Gruzinskoy SSR (Institute of Physics, Academy of Sciences Gruzinskaya SSR). Tbilisskiy gosudarstvennyy universitet (Tbilisi State University)

Card 3/4

S/056/60/039/005/044/051
B006/B077

24.6600

AUTHORS: Podgoretskiy, M. I., Hoyzen, I. I.

TITLE: The Problem of Nuclear Emission in the Presence of Nonexcited Nuclei of the Same Type

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960, Vol. 39, No. 5(11), pp. 1473 - 1475

TEXT: If a gamma quantum is emitted by an excited nucleus in the presence of one or several nonexcited nuclei of the same type, a quantum may stray in such a system, and a change of the observed frequency and a damping of the emission may occur, as is reported in the present "Letter to the Editor". The theoretical investigation is based on the assumption that the nuclei can be considered to be isotropic classical oscillators. The emission field of a nucleus in a symmetric diatomic molecule is calculated, and the emission of an excited nucleus in a chain molecule (crystal) is investigated. For the special case of a cubic crystal, the amplitude of emission is expressed by a formula. The authors thank V. I. Ogiyevetskiy, V. M. Fayn, Ya. I. Khanin, D. S. Chernavskiy, and

86927

The Problem of Nuclear Emission in the Presence of Nonexcited Nuclei of the Same Type

S/056/60/039/005/044/051
B006/B077

F. L. Shapiro for discussions. There are 3 references: 1 Soviet and 2 German.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (Joint Institute of Nuclear Research)

SUBMITTED: May 31, 1960

Card 2/2

PODGORETSKIY, M.I.; TSYGANOV, E.N.

[Determination of the true number of events and its fluctuations] Opredelenie istinnogo chisla sobytii i ego fluktuatsii po rezul'tatam dvukh nezavisimykh nabliudenii. Dubna, Ob"edinennyi in-t iadernykh issl. 1961. 8 p. (MIRA 15:1)
(Mathematical statistics)

BANNIK, B.P.; GALPER, A.M.; GRISHIN, V.G.; KOTENKO, L.P.; KUZIN, L.A.; KUZNETSOV, Ye.P.; MERSON, G.I.; PODGORETSKIY, M.I.; SIL'VESTROV, L.V.

Elastic scattering of 2.8 and 6.8 BeV/c negative pions on carbon. Dubna, Izdatel'skii otdel Ob"edinennogo in-ta iadernykh issledovanii, 1961. 20 p.

(No subject heading)

PODGORETSKIY, M. I., VERSKOVSKIY, B. I.

"Statistical Characteristics of Instruments With Feedbacks Embodying a Source of Radiation"

So: Atomnaya Energiya, Vol 11, No 5, Nov 61, pp 468-470

S/056/61/040/002/029/047
B112/B214

AUTHORS: Podgoretskiy, M. I., Stepanov, A. V.

TITLE: The problem of Doppler width of emission and absorption lines

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 40, no. 2, 1961, 561-566

TEXT: Classical and quantum-mechanical methods are used to study the consequence of the Doppler effect on the width of emission and absorption lines of gases and highly ideal liquids (very dense gases). The amplitude of the emitted radiation is $A \sim \exp\left[i\omega_0 t - \lambda t/2 + i\varkappa x(t)\right]$, where ω_0 is the frequency, $1/\lambda$ the mean lifetime, and $\varkappa$ the wave number. The dependence of the spectral intensity I on $\Omega = \omega_0 - \omega$ is given by the formula: $I(\Omega) = \mathrm{Re} \int_0^\infty d\tau \exp\left\{-i\Omega\tau - 1/2\,\lambda\tau - 1/4\,\varkappa^2\sigma^2(\tau)\right\}$.

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The problem of Doppler width...

S/056/61/040/002/029/047
B112/B214

The function $\sigma^2(\tau)$ is characteristic of the motion causing the Doppler effect. Several expressions are given in the paper for this function, including one due to S. Chandrasekar, which holds for an absorbing system diffusing in a compressed gas or a liquid:

$\sigma^2(\tau) = 4D\left[\tau - (1 - e^{-\eta\tau})/\eta\right]$, $\eta = \frac{kT}{MD}$. Here, D is the diffusion coefficient, k the Boltzmann constant, T the temperature, and M the mass of the absorbing atom. If the condition

$kT/MD^2\varkappa^2 \approx (\Lambda/2\pi L)^2 \gg 1$ is satisfied (Λ is the wavelength, L the mean free path), the following relation holds:

$I(\Omega) \sim \left[\Omega^2 + (\lambda/2 + \varkappa^2 D)^2\right]^{-1}$. In this case there is a narrowing of the line width of the order of $\varkappa^2 D$ as against the usual Doppler width $\varkappa(kT/M)$ for small L/Λ ; a broadening of the line width results for large L/Λ. The paper is concluded by a discussion of the possibility of the experimental observation of the resonance absorption of gamma quanta and slow neutrons in liquids. F. L. Shapiro is thanked for discussions,

Card 2/3

and M. V. Kazarnovskiy and I. I. Sobel'man for help. There are 12 references: 3 Soviet-bloc and 7 non-Soviet-bloc.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (Joint Institute of Nuclear Research).
Fizicheskiy institut im. P. N. Lebedeva Akademii nauk SSSR (Institute of Physics imeni P. N. Lebedev, Academy of Sciences USSR)

SUBMITTED: August 3, 1960

VISHKI, T.; GRAMENITSKIY, I.M.; KORBEL, Z.; NOMOFILOV, A.A.; PODGORETSKIY, M.I.; ROB, L.; STREL'TSOV, V.N.; TUVDENDORZH, D.; KHVASTUNOV, M.S.

Inelastic interactions between protons and nucleons at an energy of 9 Bev. Zhur.eksp.i teor.fiz. 41 no.4:1069-1075 O '61. (MIRA 14:10)

1. Ob"yedinennyy institut yadernykh issledovaniy.
(Protons) (Nucleons)

BANNIK, B.P.; GAL'PER, A.M.; GRISHIN, V.G.; KOTENKO, L.P.; KUZIN, L.A.; KUZNETSOV, Ye.P.; MERZON, G.I.; PODGORETSKIY, M.I.; SIL'VESTROV, L.V.

Elastic scattering of 2.8 and 6.8 Bev./c π^- mesons on carbon. Zhur. eksp. i teor. fiz. 41 no.5:1394-1401 N '61. (MIRA 14:12)

1. Ob"yedinennyy institut yadernykh issledovaniy i Fizicheskiy institut imeni P.N. Lebedeva AN SSSR.
(Mesons--Scattering) (Carbon)

BIRGER, N.G.; VAN GAN-CHAN [Wang Kang-ch'ang]; VAN TSU-TSZEN [Wang TS'u-tsêng]; DIN DA-TSAO [Ting Ta-ts'ao]; KATYSHEV, Yu.V.; KLADNITSKAYA, Ye.N.; KOPYLOVA, D.K.; LYUBIMOV, V.B.; NGUYEN DIN TY; NIKITIN, A.V.; PODGORETSKIY, M.I.; SMORODIN, Yu.A.; SOLOV'YEV, M.I.; TRKA, Z.

Inelastic interactions of 6.8 Bev./c π^--mesons with nucleons. Zhur. eksp. i teor. fiz. 41 no.5:1461-1474 N '61. (MIRA 14:12)

1. Ob"yedinennyy institut yadernykh issledovaniy.
(Collisions (Nuclear physics))
(Mesons) (Nucleons)

PODGORETSKIY, M.I.

ARIPOV, R. A., KOPILOVA, D. K. LYUBIMOV, V.B., NIKITIN, A. V., PODGORETSKIY, M.I., PORTNOVA, S. I., RISAEV, H., STRELTSOV, V. N., TRKA, S., and SHKLOVSKAYA, A. I.
RISAYEV, G.

"Inelastic Interactions of π^- Mesons with Nucleons at 7 Gev"

report presented at the Intl. Conference on High Energy Physics, Geneva, 4-11 July 1962

Joint Institute for Nuclear Research, Laboratory of High Energy, Dubna, 1962

OGIYEVETSKIY, V.I.; OKONOV, E.O.; PODGORETSKIY, M.I.; SARANTSEVA, V.R., tekhn. red.

[Some properties of pairs of $K^{o}K^{o}$-mesons] O nekotorykh svoistvakh par $K^{o}K^{o}$-mezonov. Dubna, Ob"edinennyi in-t iadernykh issledovanii, 1962. 13 p. (MIRA 15:6)

(Mesons)

PODGORETSKIY, M.I.

[Some characteristics of kinetic equations] O nekotorykh osobennostiakh kineticheskikh uravnenii. Dubna, Ob"edinennyi in-t iadernykh issledovanii, 1962. 15 p.

(MIRA 15:2)

(Differential equations) (Kinematics)

35563
S/056/62/042/003/019/049
B102/B138

24.6610

AUTHORS: Okonov, E. O., Podgoretskiy, M. I., Khrustalev, O. A.

TITLE: Gravitational masses of K^0 and $\overline{K}^0$ mesons

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 42, no. 3, 1962, 770 - 771

TEXT: In connection with the problem of "antigravitation" an experiment is considered to determine the up - down deviation of $\overline{K}^0$ and K^0 mesons contained in a horizontal K_2^0 meson beam. Such a deviation of the order of magnitude of de-Broglie wavelength should exist if the gravitational mass of $\overline{K}^0$ is negative. Estimates of the possible effects show, however, that they are too weak to be detectable. E. g. for the inert mass ratio $|M(K^0)-M(\overline{K}^0)|/M \leq 10^{-17}$ is obtained. D. I. Blokhintsev, V. I. Veksler, V. A. Nikitin, V. I. Ogiyevetskiy, L. B. Okun', B. M. Pontekorvo, Ya. A. Smorodinskiy and I. Ye. Tamm are thanked for discussions. There are 10 references: 5 Soviet and 5 non-Soviet. The four most recent references to English-language publications read as follows: L. Schiff. Proc. Nat.

Card 1/2

S/056/62/043/002/048/053
B108/B102

AUTHORS: Ogiyevetskiy, V. I., Okonov, E. O., Podgoretskiy, M. I.

TITLE: Properties of K-meson pairs

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 43, no. 2(8), 1962, 720-723

TEXT: Some properties of the production and decay of K-meson pairs are considered. It is pointed out that the type of decay is determined by the parity of the orbital angular momentum in the system $K^{o}\overline{K}^{o}$.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (Joint Institute of Nuclear Research)

SUBMITTED: March 31, 1962

Card 1/1

OKONOV, E.O.; PODGORETSKIY, M.I.; KHRUSTALEV, O.A.

Gravitational masses of K^o and $\bar{K}^o$ mesons. Zhur.eksp.i teor.fiz. 42 no.3:770-771 Mr '62. (MIRA 15:4)

1. Ob"yedinennyy institut yadernykh issledovaniy.
(Gravitation) (Mesons)

S/056/62/043/004/030/061
B108/B102

24.4160

AUTHOR: Podgoretskiy, M. I.

TITLE: A new method of investigating the statistical behavior of linear systems

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 43, no. 4(10), 1962, 1349-1357

TEXT: Linear systems in which one parameter x is perturbed by n random impulses $\xi a(t)$ are considered. The differential distribution of these impulses is characterized by the known function $\varphi(\xi)$ which is normalized to unity. Owing to the random impulses, x is described by the probability density $f(x,t)$. It is demonstrated that with zero initial conditions $f(x,t)$ satisfies not only the equation of motion but also an auxiliary equation $\partial f/\partial t = -nf + n\int f(x-a\xi,t)\varphi(\xi)d\xi$. Any concrete linear system can be described by finding the relevant function a(t) which denotes the deviation of the system at time t if x(0) = 1 and if other random impulses are "excluded". Taken together with the equation of motion, this auxiliary equation opens an easier approach to statistical problems, as

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A new method of investigating the... S/056/62/043/004/030/061
B108/B102

is demonstrated here by some concrete examples (ionization chamber, multiple Coulomb scattering in matter, gas avalanche etc.).

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (Joint Institute of Nuclear Research)

/B

SUBMITTED: April 11, 1962

Card 2/2

24, 6610

S/056/62/043/004/032/061
B108/B102

AUTHORS: Ogiyevetskiy, V. I., Podgoretskiy, M. I.

TITLE: Some interference phenomena in $K^0\bar{K}^0$ systems

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 43, no. 4(10), 1962, 1362-1364

JB

TEXT: Continuing earlier work (ZhETF, 43, 720, 1962) the authors studied the nature of beats of the Pais-Piccioni type in the decay of $K^0\bar{K}^0$ pairs. Such beats arise when states with even and odd orbital angular momenta interfere with each other. They depend essentially on the phase difference of the states of the K and $\bar{K}$ mesons. This phase difference can be found from the probabilities of both particles being found in a certain state if magnitude and sign of Δm of the particles is known.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (Joint Institute of Nuclear Research)

SUBMITTED: April 11, 1962

Card 1/1

S/056/63/044/002/044/065
B183/B102

AUTHOR: Podgoretskiy, M. I.

TITLE: The problem of coherent interactions between high-energy particles and nuclei

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 44, no. 2, 1963, 695-696

TEXT: As a contribution towards solving the problem of how to produce and identify hyperfragments the author discusses the proper choice of experimental conditions. Taking the example of the interaction of a K^- meson with a nucleon, $K^-+N\rightarrow\Lambda^0+\pi$, that occurs in a nucleus, the nucleus will disintegrate if the K^- momentum is large enough. But it will not disintegrate if the K^- meson has a certain critical momentum ($p_{cr}\approx 550$ Mev/c) at which the Λ^0, emitted forward in the c.m.s., will be at rest in the lab system. Therefore the two-particle reactions $K^-+A\rightarrow A_\Lambda+\pi$ have to be found and investigated in order to determine the binding energy as a function of the atomic weight. The amplitude of this

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The problem of coherent interactions ...

process can be determined from $F(\vec{q}) = f(\vec{q}) \int \Psi_{fin} e^{iqr/\hbar} \Psi_{init} d\tau$, where $\vec{q}$ is the momentum transferred to the nucleus, $f(\vec{q})$ the amplitude of the $(K^- N)$ process, A denotes a nucleus, and the wave functions Ψ_{init} and Ψ_{fin} describe initial nucleus and hyperfragment. The cross section of the $(K^- A)$ reaction considerable only when the pion is emitted into the direction of the primary K^- meson ($\theta \lesssim 10^0$) and the K^- momentum differs by less than 100Mev/c from the critical. Similar relations are observed in peripheral interactions when the nucleus remains unchanged. The critical momentum may reach infinitely large values in certain reactions, e.g. in the photoproduction of neutral pions. In such cases the momentum transferred can be arbitrarily small but finite. The author will publish a more detailed investigation of these problems.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (Joint Institute of Nuclear Research)

SUBMITTED: August 29, 1962

Card 2/2

Podgoretskiy, MI.

S/056/63/044/002/057/065
B163/B186

AUTHORS: Lyubimov, V. B., Mu Tsun, Podgoretskiy, M. I., Portnova, S. I., Strel'tsov, V. N., Trka, Z.

TITLE: Production of γ quanta in the interaction of 7 Bev π^--mesons with nucleons

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 44, no. 2, 1963, 760-763

TEXT: 395 inelastic π^--nucleon interactions, observed in a 24 liter propane bubble chamber, involving 454 electron-positron pairs were analyzed. The energy distribution of the γ quanta in the laboratory system has, apart from the maximum corresponding to the decay $\pi^0 \to 2\gamma$, a second maximum in the energy range $E_\gamma = 250 \div 300$ Mev, while in the energy range $E_\gamma = 500 \div 800$ Mev there seems to be another anomaly. The most probable explanation of the comparatively narrow second maximum at $250 \div 300$ Mev is a decay of a η-meson according to $\eta \to 2\gamma$ (273 Mev) or $\eta \to \pi^0 + \gamma$ (258 Mev). The decay $\eta \to 2\gamma$ is in accordance with the assumption that the η-meson has the quantum numbers 0^{-+} while there are strong

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objections against a $\eta \rightarrow \pi^0 + \gamma$ decay. In order to find other possible sources of γ quanta, resonance states decaying according to $x \rightarrow \pi^+ + \pi^- + \gamma$ were considered. For this purpose the effective masses $M_{\pi\pi\gamma}$ of such systems were calculated. The resulting distribution showed no distinct maxima. When, however, the same distribution of $M_{\pi\pi\gamma}$ was plotted for the cases with E_γ between 500 and 800 Mev, a distinct peak was found at $M_{\pi\pi\gamma} = 750 \div 850$ Mev/c^2, but the number of events is not sufficient to evaluate this problem in greater detail. There are 3 figures.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (Joint Institute of Nuclear Research)

SUBMITTED: November 20, 1962

L 10233-63 BDS/EWT(m)--AFFTC/ASD--IJP(C)

ACCESSION NR: AP3000038 S/0056/63/044/005/1481/1486

AUTHOR: Kopylova, D. K.; Lyubimov, V. B.; Podgoretskiy, M. I.; Kh. Rizayev; Trka, Z.

59
54

TITLE: Inelastic negative pion proton interactions at an energy of 7 BeV.

19

SOURCE: Zhurnal eksper. i teoret. fiziki, v. 44, no. 5, 1963, 1481-1486

TOPIC TAGS: pion proton interactions, inelastic, propane bubble chamber, two-prong stars, four-prong stars

ABSTRACT: A total of 154 cases of inelastic negative-pion proton interactions, accompanied by emission of a secondary proton with momentum from 180 to 500 MeV/c, were selected from stereo photographs taken with a propane bubble chamber placed in a beam of negative pions with momentum 6.8 BeV/c. This work is a continuation of an investigation in progress at the Joint Institute of Nuclear Research using a 24 - liter propane bubble chamber. An analysis of the selected events shows that they have several distinguishing features, characteristic of peripheral interactions. These features manifest themselves much less clearly

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L 10233-63
ACCESSION NR: AP3000038

5

in four-prong interactions than in two-prong ones. Also considered is a new criterion for separating interactions with a free proton, connected with the calculation of the so-called lacking mass, with the aid of which, in particular, it is shown that the fraction of background interactions with carbon is much larger in four-prong stars than in two-prong star ones. 'In conclusions, the authors are pleased to express their indebtedness to V. G. Grishin, G. I. Kopylov for useful discussions, and also V. N. Strel'tsiv and K. Igamberdiyev for help with the work.' Orig. art. has: 2 formulas and 7 figures.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (Joint Institute of Nuclear Research)

SUBMITTED: 11Dec62 DATE ACQ: 12Jun63 ENCL: 00

SUB CODE: PH NR REF SOV: 003 OTHER: 007

Card 2/2

L 17345-63 EWT(m)/BDS AFFTC/ASD/AFWL AR

ACCESSION NR: AP3007106 S/0056/63/045/003/0780/0782

AUTHOR: Podgoretskiy, M. I. 55 53

TITLE: Resonance reflection of gamma rays from the surface of a crystal

SOURCE: Zh. eksper. i teoret. fiziki, v. 45, no. 3, 1963, 780-782

TOPIC TAGS: Gamma ray, Gamma ray reflection, resonance Gamma radiation, Gamma ray scattering, Gamma ray interference, Mossbauer effect

ABSTRACT: It is pointed out that experiments on resonance reflection (scattering) of γ-rays at grazing incidence to a reflector are possible because at resonance the index of refraction of γ-rays differs from unity. Consequently, an analysis is conducted of the time dependence of the intensity of resonant γ-rays reflected from a crystal surface. It is shown that periodic time-dependent changes occur in the intensity of γ-rays (beats) if the

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L 17345-63

ACCESSION NR: AP3007106

2

resonant frequencies of the emitter and the reflector are different owing to a Doppler shift associated with a constant relative motion between the source and the reflector. In the absence of a Doppler shift the γ-ray intensity has a maximum. The predicted phenomena are analogous to those occurring in γ-rays transmitted through an absorber which is resonant to the incident γ-radiation. It is also shown that in the presence of Raleigh scattering of γ-rays by electrons interference takes place between resonance γ-ray scattering and Raleigh scattering. Interference disappears if the resonant frequencies of the emitter and reflector are the same. "The author is deeply indebted to G. Y. Kopylov for considerable help and many useful discussions." Orig. art. has: 8 formulas.

ASSOCIATION: Ob"yedinenny*y institut yaderny*kh issledovaniy (Joint Institute of Nuclear Research)

SUBMITTED: 02Apr63 DATE ACQ: 080ct63 ENCL: 00

SUB CODE: PH NO REF SOV: 004 OTHER: 009

Card 2/2

GRISHIN, V.G.; PODGORETSKIY, M.I.

Some consequences of the long lifetime of η- and ω-mesons. Zhur. eksp. i teor. fiz. 45 no.3:783-786 S '63. (MIRA 16:10)

1. Ob"yedinennyy institut yadernykh issledovaniy.
(Mesons—Decay)

PODGORETSKIY, M.I.; KHRUSTALEV, O.A.

Interference phenomena in quantum transitions. Usp. fiz. nauk 81 no.2:217-247 O '63. (MIRA 16:12)

ACCESSION NR: AP4042587 S/0056/64/046/006/2221/2226

AUTHORS: Lyuboshits, V. L.; Podgoretskiy, M. I.

TITLE: On a possible method of determining the magnetic moment of the Σ^+ hyperon

SOURCE: Zh. eksper. i teor. fiz., v. 46, no. 6, 1964, 2221-2226

TOPIC TAGS: sigma particle, hyperon, magnetic moment, depolarization, meson reaction

ABSTRACT: In view of the great difficulties entailed in the determination of the magnetic moment of the Σ^+ hyperon by standard methods using spin precession in an external magnetic field, the authors propose a new method, which does not call for a magnetic field stronger than several thousant Gauss. The gist of the method is to replace the external field by the intra-atomic field, making use of the phenomenon of depolarization of positively charged parti-

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ACCESSION NR: AP4042587

cles in condensed media, a depolarization which is due essentially to the electron magnetic field, which acts in turn on the magnetic moment of the given particle. It is shown that in principle the magnetic moment of the Σ^+ hyperon can be determined in principle from an analysis of experimental data on the asymmetry of the $\Sigma^+ \rightarrow p + \pi^0$ decay in flight and upon stopping. It is also pointed out that an analogous method can be used to measure the magnetic moments of light hyperfragments. "The authors thank S. S. Gershteyn, I. I. Gurevich, V. G. Nosov, and I. V. Yakovleva for interesting remarks." Orig. art. has: 18 formulas.

ASSOCIATION: Ob"yedinenny*y institut yaderny*kh issledovaniy (Joint Institute of Nuclear Research)

SUBMITTED: 19Jan64 ENCL: 00

SUB CODE: NP NR REF SOV: 003 OTHER: 003

Card 2/2

L 41009-65 EWT(m)/EWA(h)
ACCESSION NR: AP5007701 S/0367/65/001/001/0027/0031

AUTHOR: Baryshevskiy, V. G.; Lyuboshits, V. L.; Podgoretskiy, M. I.

TITLE: Resonance transitions of waves in the presence of splitting

SOURCE: Yadernaya fizika, v.1, no. 1, 1965, 27-31

TOPIC TAGS: resonant spin flip, wave nucleon interaction, polarized target interaction, rotating nuclear field, level splitting, resonance transition, neutron spin, neutron bombardment

ABSTRACT: The authors previously introduced (ZhETF, 47, 1050, 1964) the concept of a nuclear field connected with a polarized target and showed that such a rotating nuclear field acts on neutrons passing through the constant magnetic field in a manner similar to the action of a rotating magnetic field. Consequently, if the frequency of rotation of a nuclear field is equal to the level splitting of the neutron within the total nuclear and magnetic field, there occurs a resonant reorientation of the spin of the neutrons. The present paper studies the case when the target consists of nuclei with spins larger than 1/2. Such nuclei may exhibit quadrupole level splitting within the intracrystalline electric field, and during

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L 41009-65
ACCESSION NR: AP5007701

the passage of neutrons through such a target one may observe several resonant frequencies. The problem is treated theoretically and the results show a complete analogy with the case of ordinary paramagnetic resonance. The same type of reasoning is also applied to photons (changes in polarization) and K-mesons, and the authors conclude by pointing out that the resonant transition effects may be utilized for the design of directional monochromators (see G. M. Drabkin, ZhETF, 43, 1107, 1962). The extraction of particles with the desired energy may be achieved either by changes in the frequency of the applied field (nuclear, magnetic, electric) or by the changes in the period of the periodic interaction (produced by consecutive layers of appropriate material). "The authors thank S. S. Gershteyn and F. A. Shapiro for interesting discussions." Orig. art. has: 12 formulas.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (Joint Institute for Nuclear Studies)

SUBMITTED: 19Jun64 ENCL: 00 SUB CODE: NP

NO REF SOV: 003 OTHER: 000

Card 2/2

L 11952-66 EWT(m)/EPF(n)-2/EWA(h)

ACC NR: AP6001150 SOURCE CODE: UR/0367/65/002/003/0441/0444

AUTHOR: Baryshevskiy, V.G.; Lyuboshitz, V.L.; Podgoretskiy, M.I.

ORG: Joint Institute for Nuclear Research (Ob"yedinennyy institut yadernykh issledovaniy)

TITLE: On the scattering of neutrons on a polarized target

SOURCE: Yadernaya fizika, v. 2, no. 3, 1965, 441-444

TOPIC TAGS: nuclear magnetic moment, neutron scattering, quadrupole moment, neutron polarization

ABSTRACT: Neutron scattering on a polarized target placed in an external magnetic field is considered in the presence of quadrupole splitting of the levels of the target nuclei in an inhomogeneous intracrystalline electric field. It is shown that in both the scattered and the passing beam, a periodic variation of the intensity and polarization of the particles with time is observed. The phenomena arising during the crossing of the levels of the target nuclei are discussed. The results can be used to measure the magnetic and quadrupole moments of nuclei and to develop pulsating neutron sources. Orig. art. has: 4 formulas.

SUB CODE: 20 / SUBM DATE: 17Jan65 / ORIG REF: 004 / OTH REF: 004

HW

Card 1/1

L 18771-66 EWT(1)
ACC NR: AP6002739 SOURCE CODE: UR/0056/65/049/006/1938/1941

AUTHORS: Lyuboshits, V. L.; Onishchuk, V. A.; Podgoretskiy, M.I.

ORG: Joint Institute of Nuclear Research (Ob"yedinennyy institut yadernykh issledovaniy)

TITLE: Anisotropy of radiation of the hydrogen atom in an electric field.

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 49, no. 6, 1965, 1938-1941

TOPIC TAGS: hydrogen atom reaction, quantum field theory, transition radiation

ABSTRACT: This is a continuation of an earlier investigation by the authors (Preprint, OIYaI, R-2248, Dubna, 1965) of the effect of mixing quantum levels by means of external fields on radiative transitions of atoms, and the interference effects which arise in the transitions of atoms located in a homogeneous electric fields. In the present paper the authors discuss interference effect in the radiative transi-

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tions of atomic hydrogen in an external electric field, where noticeable interference effects can be expected even with weak fields, owing to the smallness of the separation between levels having the same j but different ℓ, and also between levels with different j. The transition between the first excited state and the ground state of hydrogen is studied by way of an example for which the actual calculations are made. It is shown that whereas in a homogeneous electric field mixing will occur between all the three levels $2P_{1/2}$, $2S_{1/2}$, and $2P_{3/2}$, and interference will occur for the E1 transitions because of the mixing, in the case when the Stark shift of these levels is much less than the separation between them (fields weaker than 500 v/cm), the $2P_{3/2}$ level mixes with the $2P_{1/2}$ level and noticeable anisotropy and partial linear polarization appear. Similar effects can occur for transitions between levels with larger quantum numbers. However, these come into play at considerably weaker fields. For an anisotropy in the angular distribution of radiation of about 0.1, the field required for the $2P_{1/2} \rightarrow 1S_{1/2}$ transition is 500 v/cm, but for the

L 18771-66
ACC NR: AP6002739

$3S_{1/2} \rightarrow 2P_{1/2}$ transition it is only about 50 v/cm. Orig. art. has: 1 figure and 12 formulas.

SUB CODE: 20/ SUBM DATE: 23Jul65/ ORIG REF: 002/

Card 3/3 mjg 5

L 15663-66 EWT(1) IJP(c) WW/GG

ACC NR: AP6000214 SOURCE CODE: UR/0056/65/049/005/1556/1557

AUTHORS: Baryshevskiy, V. G.; Lyuboshits, V. L.; Podgoretskiy, M.I.

ORG: Joint Institute of Nuclear Research (Ob"yedinennyy institut yadernykh issledovaniy) 61 B

TITLE: Spontaneous transitions upon passage of light through anisotropic media

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 49, no. 5, 1965, 1556-1557

TOPIC TAGS: light polarization, ~~refractive index~~, light transmission, double refraction, magnetic field, electric field, anisotropic medium

ABSTRACT: This is a continuation of an earlier paper by the authors (Yadernaya fizika v. 1, 27, 1965) dealing with resonance variations induced in the polarization of light passing through an anisotropic medium by a high frequency electric or magnetic field. It is shown in the present paper that passage of light of frequency ω through a doubly refracting medium gives rise to radiation of electromagnetic

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L 15663-66
ACC NR: AP6000214

waves with a frequency $\Omega = \omega\Delta n/n_0$ (n is the refractive index and n_0 its isotropic part). The probability of the spontaneous transitions produced in the light is determined by calculating the matrix element of the operator of interaction between the transmitted light and the medium in the electric field. The relative magnitude of this effect is quite small, 10^{-15} -- 10^{-16} for guaiacol [$C_6H_4(OCH_3)OH$] at $\Omega \sim 10^{14}$ sec^{-1} and visible light, is barely at the threshold of detection if a laser light beam is used. Orig. art. has: 5 formulas.

SUB CODE: 20/ SUBM DATE: 03Jul65/ ORIG REF: 002/

Card 2/2

LYUBOSHITS, V.L.; ONISHCHUK, V.A.; [illegible], M.I.

Anisotropy of the radiation of a hydrogen atom in an electric field. Zhur.eksp. i teor.fiz. 49 no.6:1938-1941 D '65.
(MIRA 19:1)

1. Ob"yedinennyy institut yadernykh issledovaniy. Submitted July 23, 1965.

BARYSHEVSKIY, V.G.; LYUBOSHITS, V.L.; PODGORETSKIY, M.I.

Spontaneous transitions during the passage of light through anisotropic media. Zhur.eksp. i teor.fiz. 49 no.5:1556-1557 N '65. (MIRA 19:1)

1. Ob"yedinennyy institut yadernykh issledovaniy.

BARYSHEVSKIY, V.G.; LYUBOSHITS, V.L.; PODGORETSKIY, M.I.

Resonance transitions of waves in the presence of splitting. IAd. fiz. 1 no.1:27-31 Ja '65. (MIRA 18:7)

1. Ob"yedinennyy institut yadernykh issledovaniy.

LYUBOSHITS, V.L.; OKONOV, E.O.; PODGORETSKIY, M.I.

Galactic hypercharge field and the disintegration of long-lived neutral K-mesons into two π-mesons. IAd. fiz. 1 no.3:490-496 Mr '65. (MIRA 18:5)

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LYUBOSHITS, V.L.; OKONOV, E.O.; PODGORETSKIY, M.I.; U TSZUN-FAN' [Wu TSung-fan]

Disturbance of CP-invariance and interference phenomena in the disintegration of a neutral K-meson into two π-mesons. IAd. fiz. 1 no.3: 497-506 Mr '65. (MIRA 18:5)

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BARYSHEVSKIY, V.G.; LYUBOSHITS, V.L.; PODGORETSKIY, M.I.

Effect of the interaction between neutrons and nuclei on the paramagnetic resonance width in neutron beams. Zhur. eksper. i teor. fiz. 48 no.4:1146-1149 Ap '65.

(MIRA 18:5)

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LYUBOSHITS, V.L.; OKONOV, E.O.; PODGORETSKIY, M.I.

Effect of the medium on the properties of pairs of $K^{o}\overline{K}^{o}$-mesons. Zhur. eksp. i teor. fiz. 47 no.5:1868-1873 N '64. (MIRA 18:2)

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L 52951-65 EWT(1)/EPF(c)/EEC(t) Pi-4 IJP(c) WW/GG

ACCESSION NR: AP5010510 UR/0056/65/048/004/1146/1149

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AUTHOR: Baryshevskiy, V. G.; Lyuboshits, V. L.; Podgoretskiy, M. I.

TITLE: Effect of interaction between neutrons and nuclei on the paramagnetic resonance width in a neutron beam

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 48, no. 4, 1965, 1146-1149

TOPIC TAGS: paramagnetic resonance, neutron beam, neutron interaction, polarization, resonance line width

ABSTRACT: This is a continuation of earlier work on resonance phenomena that occur in beams of slow neutrons (ZhETF v. 47, 1050, 1964 and Yadernaya fizika v. 1, No. 1, 1965). The present paper deals with paramagnetic resonance in a neutron beam with account of interaction between the neutrons and the target nuclei. The effect of polarization of the target on the width of the resonance line is investigated and it is shown that the width of the resonance line is determined by incoherent processes resulting in the escape of neutrons from the beam. The results are analyzed under the assumption that paramagnetic resonance can be regarded as

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ACCESSION NR: AP5010510

photon absorption and emission processes during transitions between levels of finite width. Orig. art. has: 8 formulas.

ASSOCIATION: Ob"edinennyy institut yaderrykh issledovaniy (Joint Institute of Nuclear Research)

SUBMITTED: 23Oct64 ENCL: 00 SUB CODE: SS, NP

NR REF SOV: 003 OTHER: 002

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